

Name: _____

Date: _____

Exam: Function Reflections (Solution version 4)

1. Let function f be defined by the polynomial below:

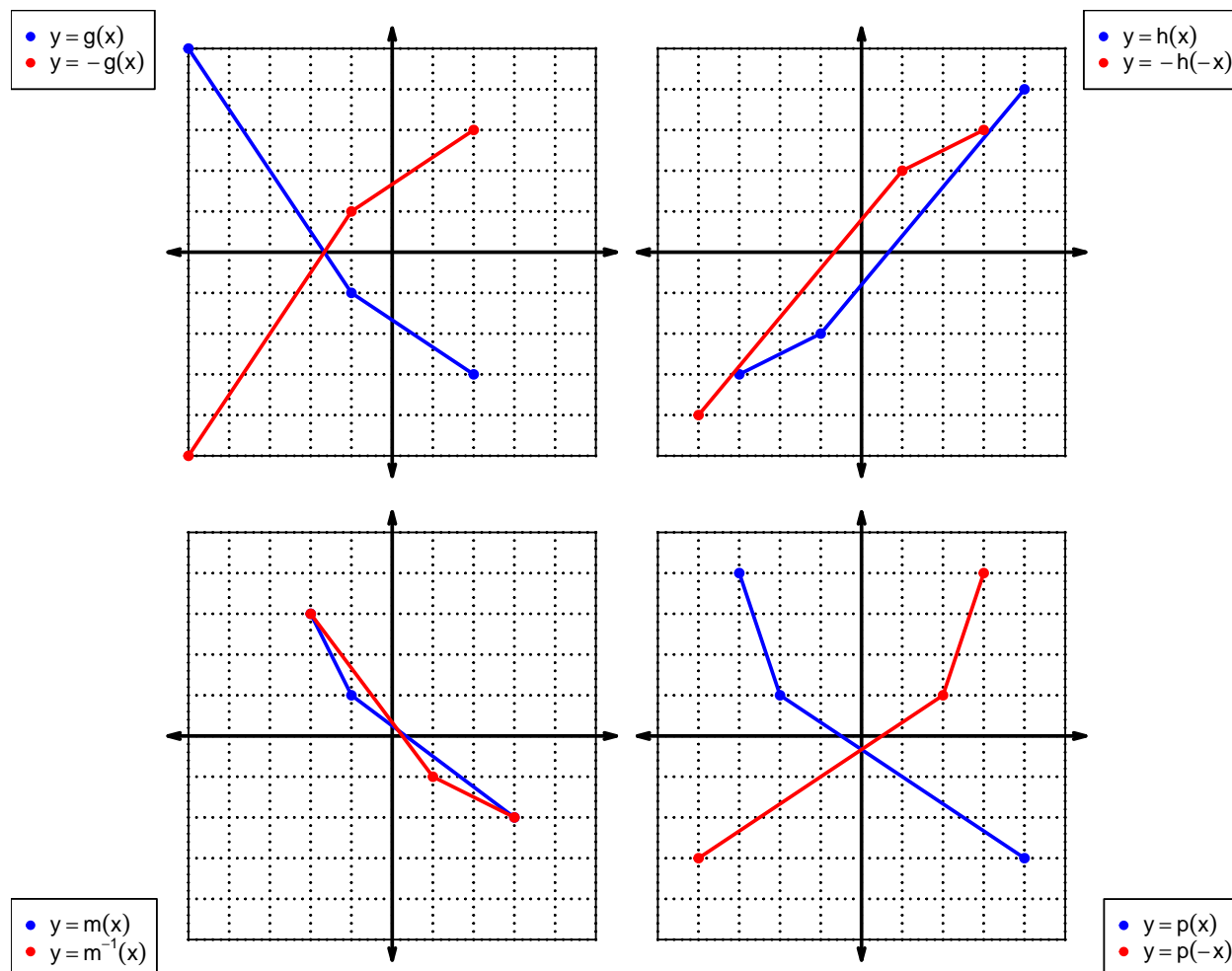
$$f(x) = -4x^5 + 9x^4 - 8x^3 + 5x^2 + 7x + 3$$

Draw lines that match each function reflection with its polynomial:

Reflections**Polynomials**

| | | | |
|----------|---|---|---------------------------------------|
| $-f(x)$ | ● | ● | $4x^5 + 9x^4 + 8x^3 + 5x^2 - 7x + 3$ |
| $-f(-x)$ | ● | ● | $4x^5 - 9x^4 + 8x^3 - 5x^2 - 7x - 3$ |
| $f(-x)$ | ● | ● | $-4x^5 - 9x^4 - 8x^3 - 5x^2 + 7x - 3$ |

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f , g , and h are defined by the table below.

| x | $f(x)$ | $g(x)$ | $h(x)$ |
|-----|--------|--------|--------|
| 1 | 2 | 3 | 4 |
| 2 | 3 | 4 | 6 |
| 3 | 9 | 7 | 1 |
| 4 | 6 | 9 | 7 |
| 5 | 4 | 1 | 5 |
| 6 | 7 | 6 | 9 |
| 7 | 5 | 8 | 2 |
| 8 | 1 | 5 | 3 |
| 9 | 8 | 2 | 8 |

3. Evaluate $g(7)$.

$$g(7) = 8$$

4. Evaluate $h^{-1}(1)$.

$$h^{-1}(1) = 3$$

5. Assuming f is an **even** function, evaluate $f(-9)$.

If function f is even, then

$$f(-9) = 8$$

6. Assuming g is an **odd** function, evaluate $g(-2)$.

If function g is odd, then

$$g(-2) = -4$$

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7. A function, f , is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g , is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) = -x^2 + 1$$

- a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^2 + 1$$

$$p(-x) = -x^2 + 1$$

- b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -(-x^2 + 1)$$

$$-p(-x) = x^2 - 1$$

- c. Is polynomial p even, odd, or neither?

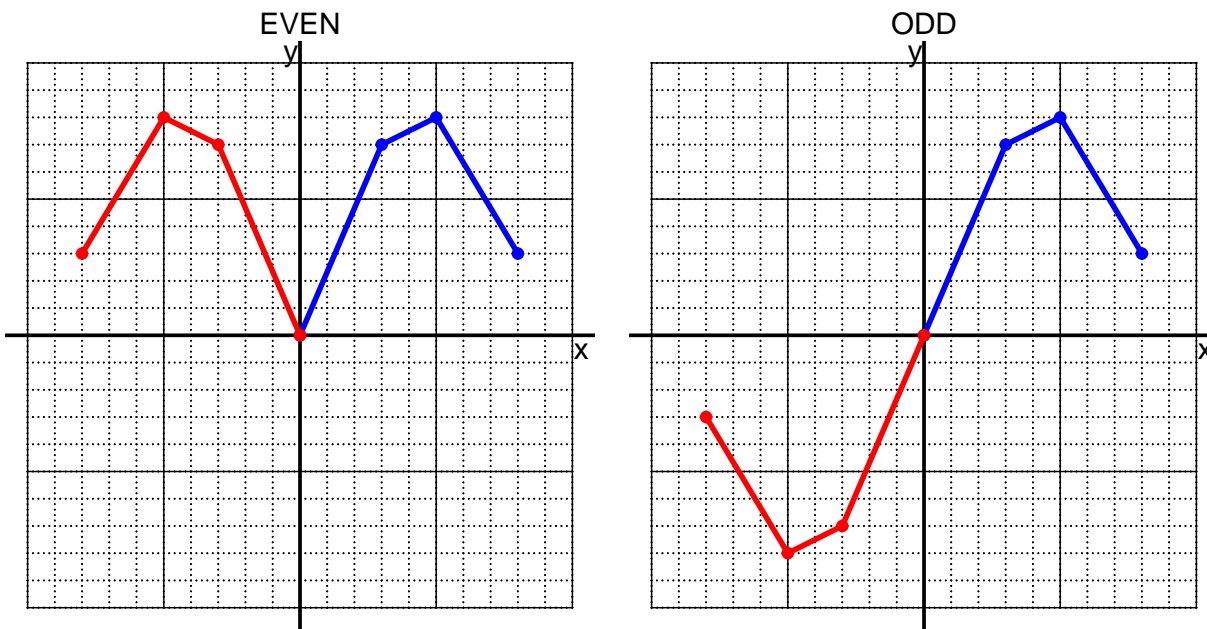
even

- d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 8x - 4$$

a. Evaluate $f(7)$.

step 1: multiply by 8
step 2: subtract 4

$$f(7) = 8(7) - 4$$

$$f(7) = 52$$

b. Evaluate $f^{-1}(76)$.

step 1: add 4
step 2: divide by 8

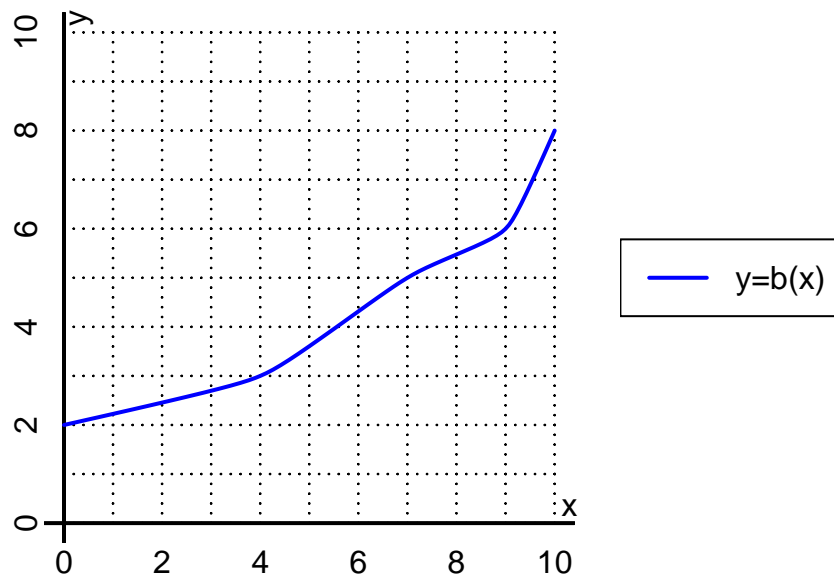
$$f^{-1}(x) = \frac{x + 4}{8}$$

$$f^{-1}(76) = \frac{(76) + 4}{8}$$

$$f^{-1}(76) = 10$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(9)$.

$$b(9) = 6$$

b. Evaluate $b^{-1}(3)$.

$$b^{-1}(3) = 4$$

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11. Function f is defined by the table below.

a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

| x | $f(x)$ | $-f(x)$ | $f(-x)$ | $-f(-x)$ |
|-----|--------|---------|---------|----------|
| -2 | -6 | 6 | 6 | -6 |
| -1 | 8 | -8 | -8 | 8 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | -8 | 8 | 8 | -8 |
| 2 | 6 | -6 | -6 | 6 |

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.